# Background Document:
# Development of Constituents of Concern for Dyes & Pigments Listing Determination

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## Introduction

This background document describes the Office of Solid Waste's (OSW's) selection of constituents of concern for the dyes and pigments listing determination effort initiated in 2002. Our goal was to develop a list of chemicals that (1) could reasonably be expected to be associated with wastes from the production of the dyes and pigments covered by the Environmental Defense (ED) consent decree, (2) could be derived entirely from sources that are not restricted by confidential business information (CBI) claims, and (3) would serve as a starting place for subsequent risk assessment analyses.

The final results of this analysis are provided below; Attachment 1 provides an explanation of codes used in this table and throughout this document. The resultant 35 constituents were assessed via risk assessment with the purpose of establishing regulatory loading levels in wastes from the production of azo, triarylmethane and anthraquinone dyes, pigments and FD&C colorants.

Dye and Pigment Constituents of Concern

| Chemical Compound | Synonyms | CAS | EPA record sampling data | Split CPMA sample data | Public Comments | Colour Index (1) | Kirk-Othmer (2) | TRI (3) | EU Ban (73) | TAM Colour Index | Non-CBI §3007 waste data | Hawley/ Merck | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aminoanthraquinone | 2-Aminoanthraquinone | 117-79-3 | | 2 | | X | | | | | 0 | | YES |
| Aniline | Benzenamine; aniline oil, aminobenzene | 62-53-3 | 22 | 11 | 9 | X | X | A2, R5 | | 1 | 24 | H/M (10) | YES |
| o-Anisidine | 2-methoxyaniline, 2-methoxybenzenamine | 90-04-0 | 5 (28) | 2 | 5 | X | | A3 | XX | | 0 | H/M (11) | YES |
| Azobenzene | diphenyldiazene; diphenyl diimide | 103-33-3 | 5 (30) | | 2 | | | | | | | H | YES |
| Barium | | 7440-39-3 | 5 | 7 | 1 | | | A3, R13 | | | 32 | H | YES |
| Benzaldehyde | | 100-52-7 | | | 2 | X | X | | | 3 | 1 | H | YES |
| Benzidine | | 92-87-5 | 3 | | 1 | X | | | XX | | | H/M (10) | YES |
| 4-4'-bis(dimethylamino) benzophenone | | 90-94-8 | | | | X | | | | 2 | | | YES |
| 4-Chloroaniline | p-Chloroaniline | 106-47-8 | 5 | 3 | 2 | | | R1 | XX | | | | YES |
| Copper | | 7440-50-8 | 5 | 6 | 1 | | | A7 R8 | | 1 | 39 | | YES |
| p-Cresidine | 3-amino-4-methoxy-toluene, 6-methoxy-m-toluidine, 5-methyl-o-anisidine | 120-71-8 | | | | X | | A1 R1 | XX | | | H | YES |
| p-Cresol | 4-methylphenol | 106-44-5 | 4 | 3 (19) | 5 | X | | | | | 2 | | YES (for mixed cresols) |
| 1,2-Dichlorobenzene | o-dichlorobenzene | 95-50-1 | 8 | | | | X (dye carrier) | R2 | | | | H/M | YES |
| 3,3'-Dichlorobenzidine | 3,3'-dichlorobiphenyl-4,4'-ylenediamine | 91-94-1 | 4 | 4 | | | | A3 R11 | XX | | 19 | H/M (11) | YES |
| 3,3'-Dimethoxybenzidine | Dianisidine | 119-90-4 | 4 | (20) | 4 | X | | | XX | | 1 | H/M (11) | YES |
| 2,4-Dimethylaniline | 2,4-xylidine | 95-68-1 | 1, 1 (74) | (20) | | | | | studied | | 6 mixed, 1 2,4- | | YES |
| N,N-Dimethylaniline | N,N-Dimethylbenzenamine | 121-69-7 | 1 | | 1 | X | X | R2 | | 6 | 7 | H/M (10) | YES |
| 3,3'-Dimethylbenzidine | 4,4'-bi-o-toluidine, o-tolidine, diaminoditolyl | 119-93-7 | 1 | | | X | | | XX | | | H/M (10) | YES |
| Diphenylamine | N-Phenylbenzeneamine | 122-39-4 | 4 (29) | | 4 | X | | | | | | H/M (10) | YES |
| Formaldehyde | | 50-00-0 | 7 | 3 | 2 | X | | R5 | | 1 | 1 | M (10) | YES |
| Lead | | 7439-92-1 | 2 | 2 | 1 | | | R2 | | 2 | 5 | H | YES |
| Methanol | | 67-56-1 | | | | | | R8 | | | 24 | H | YES |

Dye and Pigment Constituents of Concern

| Chemical Compound | Synonyms | CAS | EPA record sampling data | Split CPMA sample data | Public Comments | Colour Index (1) | Kirk-Othmer (2) | TRI (3) | EU Ban (73) | TAM Colour Index | Non-CBI §3007 waste data | Hawley/ Merck | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-Methylenedianiline | p-p' - Diaminodiphenyl methane; 4,4'-Methylene-bis[benzenamine] | 101-77-9 | | | | | X | R1 | XX | | | H/M (11) | YES |
| Naphthalene | | 91-20-3 | 8 | | 2 | | | A1 R1 | | | | H/M (21) | YES |
| 5-Nitro-o-anisidine | 2-methoxy-5-nitroaniline | 99-59-2 | | | X | X | | R1 | | | 0 | | YES |
| 5-Nitro-o-toluidine | 2-methyl-5-nitroaniline; 2-amino-4-nitrotoluene | 99-55-8 | | 1 | 2 | X | | A1 R1 | XX | | | H | YES |
| Phenol | | 108-95-2 | 10 | 6 | 1 | X | X | A1 | | 1 | 10 | M (10) | YES |
| 1,2-Phenylenediamine | o-phenylenediamine, 2-aminoaniline | 95-54-5 | 5 (28) | | 2 | X | | A1 | | | | H/M (10) | YES |
| 1,3-Phenylenediamine | 3-Aminoaniline, m-phenylenediamine | 108-45-2 | | | | X | | A1 | | | 17 | H | YES |
| 1,4-Phenylenediamine | 4-aminoaniline; p-Phenylenediamine | 106-50-3 | 5 (28) | | 5 | X | | | | | 1 | M (11) | YES |
| Sodium nitrite | | 7632-00-0 | | | | | | A6 R17 | | | 30 | H/ M(50) | YES as nitrite |
| Toluene-2,4-diamine | 4-m-tolylenediamine, 2,4-diaminotoluene, 4-methyl-m-phenylenediamine | 95-80-7 | | | | X | X | A1 R1 | XX | | | H | YES |
| o-Toluidine | 2-toluidine; 2-aminotoluene | 95-53-4 | 9 (25) | 6 (26), 1 | 5 | X | | R3 | XX | 1 | 2 | H | YES |
| p-Toluidine | 4-toluidine; 4-aminotoluene | 106-49-0 | 9 (25), 1 | 6 (26), 1 | 4 | X | | | | 1 | | | YES |
| Zinc | | 7440-66-6 | 5 | 6 | | | | R2 | | 3 | 10 | H | YES |

Our general process was to create a spreadsheet of all of the chemicals identified in a series of non-CBI data sources, and cull the resultant list to remove redundancies, chemical classes, compounds not expected to have toxicity benchmarks, and chemicals not expected to be directly linked with the manufacture of the targeted dyes and pigments. Our data sources and assumptions are described further below.

1. Development of Primary List

We identified six primary sources that we used to create a "primary list" of over 500 potential constituents of concern, as describe further below.

EPA Analytical Data

We used the analytical data we developed from sampling and analysis of the wastes of concern in the early 1990s, previously used to support the 1994 and 1999 proposed listing determinations, as masked and aggregated per Table 1 of the June 2003 settlement agreement with the Magruder plaintiffs.

CPMA Split Sample Data

We also used data that the Color Pigments Manufacturers Association (CPMA) provided. These non-CBI aggregations of the pigment manufacturers' split sample analysis of EPA's record samples were submitted in an April 20, 1994 letter from J. Lawrence Robinson, CPMA, to Ed Abrams, EPA.

RCRA §3007 Survey

Where possible, we used non-CBI RCRA §3007 questionnaire information and data, collected during the 1992 Agency survey of wastes generated in the dyes and/or pigments industries, and supplemented, corrected, and updated (for the year 1997) by the surveyed facilities. Surveys submitted by the twelve plaintiffs in Magruder remain unavailable. The available surveys are 1) surveys submitted by non-plaintiffs who made no CBI claims; 2) surveys submitted by non-plaintiffs who made CBI claims, but later withdrew them; and 3) surveys submitted by non-plaintiffs who made CBI claims, but EPA determined that the claims were not valid using the procedures set out in 40 CFR Part 2.

EU Banned Aromatic Amines

Our fourth primary source of constituents of concern was the list of 22 aromatic amines of concern in the European Union (EU)'s directive for a community ban on azocolourants (76/769/EEC, Annex I, point 43). This directive bans the use of carcinogenic azocolourants and sale of textile and leather articles containing such substances. The aromatic amines of concern that the European community has linked to azo dyes include:

| EU Banned Aromatic Amines | CAS # |
|---|---|
| 4-Aminoazobenzene | 60-09-3 |
| o-Aminoazotoluene | 97-56-3 |
| 4-Aminobiphenyl | 92-67-1 |
| o-Anisidine | 90-04-0 |
| Benzidine | 92-87-5 |
| 4-Chloroaniline | 106-47-8 |
| 4-Chloro-o-toluidine | 95-69-2 |
| p-Cresidine | 120-71-8 |
| 3,3'-Dichlorobenzidine | 91-94-1 |
| 3,3'-Dimethoxybenzidine | 119-90-4 |
| 3,3'-Dimethylbenzidine | 119-93-7 |
| 4,4'-Methylenebis(2-chloroaniline) | 101-14-4 |
| 4,4'-Methylenedianiline | 101-77-9 |
| 4,4'-Methylenedi-o-toluidine | 838-88-0 |
| 2-Naphthylamine | 91-59-8 |
| 5-Nitro-o-toluidine | 99-55-8 |
| 4,4'-Oxydianiline | 101-80-4 |
| 4,4'-Thiodianiline | 139-65-1 |
| Toluene-2,4-diamine | 615-05-4 |
| o-Toluidine | 95-53-4 |
| 2,4,5-Trimethylaniline | 137-17-7 |

We also used an EU study of azo-dyes in cosmetics[1] as a reference, although not as a primary source for the purpose of selecting constituents of concern. This study was conducted in conjunction with a separate EU directive (76/768/EEC). Table 2 of this study is a list of aromatic

[1]Studied by EU in the context of Directive 76/768/EEC: SCCNFP/0495/01, Opinion of the Scientific Committee on Cosmetic Products and Non-Food Products Intended for Consumers concerning "The Safety Review of the Use of Certain Azo-Dyes in Cosmetic Products", 2/27/02. http://europa.eu.int/comm/food/fs/sc/sccp/out155_en.pdf

amines with carcinogenic potential and includes all of the 22 amines listed above, as well as :

- o 4-amino-3-fluorophenol (399-95-1)
- o 6-amino-2-ethoxynaphthalene (293733-21-8)
- o 2,4-xylidine (95-68-1)
- o 2,6-xylidine (87-62-7).

We identified the two xylidines in our primary list as a result of §3007 survey reporting. The other two compounds were not reported in any of the six primary sources, and, even if they had, would not have been selected as constituents of concern due to a lack of toxicity benchmarks.

Triarylmethane Raw Materials

Our fifth primary source of constituents of concern was a subset of raw materials reported in the Colour Index (3rd Edition, Issue 3). We identified those raw materials that were reported to be associated with the production of triarylmethane dyes and pigments at U.S. manufacturing sites. We focused on TAM raw materials because we had difficulties obtaining samples of these wastes during our field investigation (see 59 FR 66095 and 66103, and 64 FR 40199).

Public Comments

A number of commenters on the1994 and 1999 proposals were dyes and/or pigments manufacturers. They frequently discussed the composition of their wastes, either as characterized by EPA's record sampling or their own confirmatory analyses. We tallied the number of times chemicals were confirmed or acknowledged to be present in the industries' wastes.

Consolidation of Metals and Other Classes

After compiling the primary sources described above, we then consolidated all information gathered for metal compounds under their corresponding elemental metals. This consolidation is consistent with our general approach in risk assessment for listing determinations to assess the elemental metals rather than the wide range of salts or compounds that may exist in waste matrices. We made the following consolidations:

| Chemical Compound | Synonyms | CAS | TRI (3) | TAM Colour Index | Non-CBI §3007 waste data |
|---|---|---|---|---|---|
| As Arsenic: | | | | | |
| Arsenic acid | | 1327-52-2 | | 1 | |
| As Barium: | | | | | |
| Barium compounds | | None | A2, R13 | | |
| Barium chloride | | 10361-37-2 | | | 13 |
| Barium sulfate | Barite | 7727-43-7 | | | 8 |
| As Chromium: | | | | | |

| Chemical Compound | Synonyms | CAS | TRI (3) | TAM Colour Index | Non-CBI §3007 waste data |
|---|---|---|---|---|---|
| Chromium compounds | | None | A2 R3 | | |
| Dichromate-oxalic acid | | 814-90-4 | | 1 | |
| Sodium dichromate | | 10588-01-9 | | | 1 |
| As Copper: | | | | | |
| Copper bromide | | 7787-70-4 | | | 1 |
| Copper complex | | None | | | 3 |
| Copper compounds | | None | A6 R10 | | |
| Copper hydroxide | | 20427-59-2 | | | 1 |
| Copper phthalocyanine | Phthalocyanine blue | 147-14-8 | | | 8 |
| Copper sulfate | | 7758-98-7 | | | 3 |
| Copper sulfide | | | | | 1 |
| Cu (+2) ion | | None | | | 6 |
| Cupric chloride | | 7447-39-4 | | 1 | |
| Cuprous chloride | Copper chloride | 7758-89-6 | | | 4 |
| Sodium bromocuprate | | CAS NA | | | 2 |
| Sodium cyanocuprate | sodium copper cyanide | CAS NA | | | 2 |
| As Iron: | | | | | |
| Iron compounds | | | | | 2 |
| Iron oxide | | 1317-61-9 | | | 1 |
| Iron powder | | 7439-89-6 | | | 2 |
| Iron sulfate | | 7720-78-7 | | | 3 |
| As Lead | | | | | |
| Lead compounds | | None | R1 | | |
| Lead peroxide | | 1309-60-0 | | 2 | |
| As Manganese: | | | | | |
| Manganese compounds | | None | A1 R3 | | |
| Manganese dioxide | | 1313-13-9 | | | 1 |
| Manganese sulfate | | 7785-87-7 | | | 1 |
| As Molybdenum: | | | | | |
| Sodium molybdate | | 7631-95-0 | | | 1 |
| As Nickel: | | | | | |
| Nickel sulfate | | 7786-81-4 | | | 1 |
| Nickelous carbonate | Nickel carbonate | 3333-67-3 | | | 2 |
| As Strontium: | | | | | |
| Strontium nitrate | | 10042-76-9 | | | 1 |
| As Tin: | | | | | |
| Stannic chloride | Tin (IV) chloride | 7646-78-8 | | | 3 |
| As Zinc: | | | | | |
| Zinc chloride | | 7646-85-7 | | 3 | 3 |
| Zinc compounds | | None | R1 | | |

We consolidated the entries for m-xylene under the category of “mixed xylenes” and several organic salts under their corresponding base organic compounds.

| | Synonyms | CAS # | Public Comments | TRI | §3007 Q |
|---|---|---|---|---|---|
| 3,3'-Dichlorobenzidine dihydrochloride | | 612-83-9 | | A4, R10 | |
| Sodium benzoate | Benzoic acid, sodium salt | 532-32-1 | | | 1 |
| o-Toluidine hydrochloride | | 636-21-5 | | | 2 |
| m-Xylene | | 108-38-3 | 1 | R2 | |

2. Risk Assessment Suitability Screening Criteria

We developed a series of criteria to determine whether the compounds on the primary list were good candidates for risk assessment. We eliminated the following categories of compounds, as described further below:

- o Compounds without Chemical Abstract System (CAS) numbers
- o Products
- o Gases
- o Innocuous compounds
- o Corrosive compounds

a. CAS numbers

CAS numbers are widely used to track and cross-reference chemicals. We used several Internet databases to search for CAS numbers, including:

- The Hazardous Substance Data Base (http://www.toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB)
- ChemIDPlus (http://chem.sis.nlm.nih.gov/chemidplus/cmplxqry.html)
- ChemFinder (http://chemfinder.cambridgesoft.com/)

When we were unable to identify CAS numbers through these various sources, we assumed that it would be virtually impossible to identify the types of toxicity benchmarks and chemical/physical properties necessary to conduct risk assessment without conducting fundamental scientific research. Given both the time constraints of the dye and pigment listing determination and the extensive list of compounds WITH CAS numbers, we decided to screen these compounds WITHOUT CAS numbers from our list of constituents targeted for risk assessment. Attachment 2 presents the constituents that were culled from the primary constituent list because of the unavailability of CAS numbers.

b. Products

We eliminated products from the primary list. While products are likely to be present in wastes, we focused instead on intermediates and degradation products. Availability of analytical methods and toxicity data for products tend to be limited. In addition, products vary from batch to batch (while intermediates and degradation products are linked to multiple products within a given class). Note that the category of constituents without CAS numbers also contains products (see Attachment 2).

| | Synonyms | CAS # | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|
| Acid red 112 | Ponceau S | 6226-79-5 | 1 | |
| Basic violet 3 | Crystal Violet | 548-62-9 | 4 | |
| Bromophenol blue | | 115-39-9 | 1 | |
| D&C yellow 10 dye | | 8004-92-0 | 2 | |
| Direct blue | | 2602-46-2 | 2 | |

| | Synonyms | CAS # | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|
| Disperse blue 3 | | 2475-46-9 | 3 | HSDB |
| Disperse blue 27 | | 15791-78-3 | 3 | |
| Disperse blue 79 | | 3956-55-6 | 3 | |
| Disperse red 60 | 1-Amino-2-phenoxy-4-hydroxyanthraquinone | 17418-58-5 | 1 | |
| Disperse red 167 | | 61968-52-3 | 3 | |
| FD&C blue 1 dye | | 3844-45-9 | 2 | |
| FD&C blue 2 dye | | 860-22-0 | 2 | |
| FD&C yellow 5 | Tartrazine | 1934-21-0 | 7 | |
| FD&C yellow 6 | | 2783-94-0 | 7 | |
| Leucomalachite green | | 129-73-7 | 1 | |
| Mordant red 11 | Alizarin | 72-48-0 | 1 | |
| Orange II | | 633-96-5 | 1 | |
| Pararosaniline chloride | C.I. Basic Red 9 | 569-61-9 | 1 | HSDB (2B) |
| Phenol red | | 143-74-8 | 2 | |
| Pigment green 7 | | 1328-53-6 | 2 | |
| Pigment red 22 | Art red | 6448-95-9 | 2 | |
| Pigment red 23 | | 6471-49-4 | 2 | |
| Pigment red 53:1 | Benzenesulfonic acid, 5-chloro-2-((2-hydroxy-1-naphthalenyl) azo)-4-methyl-, barium salt (2:1) | 5160-02-1 | 15 | |
| Pigment red 57:1 | | 5281-04-9 | 8 | |
| Pigment yellow 1 | Fast Yellow G | 2512-29-0 | 3 | |
| Pigment yellow 12 | | 6358-85-6 | 14 | |
| Pigment yellow 65/74 | | 6358-31-2 for PY74 | 2 | |
| Sudan II | C.I. Solvent Orange 7 | 3118-97-6 | 2 | HSDB |

c. Gases

We eliminated gases on the primary constituent list because they will not be present in wastes (as disposed). Note that a number of the reported hits in the §3007 questionnaire were in fact gaseous streams.

| | CAS # | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|
| Ammonia | 7664-41-7 | 1 | | A1, R11 | | 8 | | |
| Bromine | 7726-95-6 | | | R2 | | 7 | X (10) | |
| Carbon dioxide | 124-38-9 | | | | | 8 | | |
| Chlorine | 7782-50-5 | | | A1 R1 | | | | |
| Hydrogen | 1333-74-0 | | | | | 2 | | |
| Nitrogen | 7727-37-9 | | | | | 6 | | |
| Nitrous oxide | 10024-97-2 | | | | | 4 | | |
| Phosgene | 75-44-5 | | X | A1 R1 | 2 | | | IRIS |

d. Innocuous compounds

We eliminated the following compounds as generally being innocuous (e.g., not comprised of toxic metals) and not amenable to risk assessment and analysis (due to disassociation). These compounds were each reported as waste components in the §3007 surveys.

| | Synonyms | CAS # | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|
| Aluminum chloride | | 16603-84-2 | 9 | |
| Aluminum hydroxide | | 20768-67-6 | 6 | |
| Aluminum sulfate | | 10043-1-3 | 2 | |
| Ammonium chloride | | 12125-002-9 | 1 | |
| Ammonium hydroxide | | 1336-21-6 | 3 | |
| Ammonium sulfate | | 7783-20-2 | 2 | |
| Calcium carbonate | | 471-34-1 | 1 | |
| Calcium chloride | | 10043-52-4 | 2 | |
| Calcium oxide | Lime | 1305-78-8 | 5 | |
| Calcium sulfate | | 7778-18-9 | 5 | |
| Disodium phosphate | Sodium hydrogen phosphate | 7558-79-4 | 3 | |
| Potassium chloride | | 7447-40-7 | 4 | |
| Sodium acetate | | 127-09-3 | 15 | |
| Sodium bicarbonate | Baking soda | 144-55-8 | 1 | |
| Sodium bromide | | 7647-15-6 | 1 | HSDB |
| Sodium carbonate | Soda ash | 497-19-8 | 13 | |
| Sodium chlorate | | 7775-09-9 | 4 | |
| Sodium chloride | Salt | 7647-14-5 | 105 | |
| Sodium dithionite | Sodium hydrosulfite | 7775-14-6 | 3 | |
| Sodium hydrosulfide | | 16721-80-5 | 5 | |
| Sodium hypochlorite | | 10022-70-5 | 8 | |
| Sodium iodide | | 7681-82-5 | 1 | |
| Sodium metabisulfite | | 7681-57-4 | 28 | |
| Sodium metasilicate | | 6834-92-0 | 10 | |
| Sodium phosphate | | 7601-54-9 | 2 | |
| Sodium sulfate | | 7757-82-6 | 15 | |
| Sodium sulfide | | 1313-82-2 | 1 | |
| Sodium sulfite | | 7757-83-7 | 1 | HSDB (3) |
| Sodium tetraborate decahydrate | Borax | 1303-96-4 | 2 | |
| Sodium thiosulfate | | 7772-98-7 | 3 | |

e. Corrosive compounds not amenable to risk assessment

We deleted the following inorganic acids and bases because the risks associated with these compounds are already addressed through the corrosivity characteristic.

| | Synonyms | CAS # | TRI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|
| Boric acid | | 11113-50-1 | | 2 | | |
| Hydrobromic acid | Hydrogen bromide | 10035-10-6 | | 4 | | |
| Hydrochloric acid | | 7647-01-0 | R5 | 76 | | |
| Nitric acid | | 7697-37-2 | A1 R2 | 2 | X (23) | |
| Nitrous acid | | 7782-77-6 | | 5 | | |
| Phosphomolybdic acid | | 11104-88-4 | | 3 | | RTI-NO |
| Phosphoric acid | | 7664-38-2 | | 8 | | |
| Potassium hydroxide | | 1310-58-3 | | 2 | | |
| Sodium hydroxide | Caustic soda | 01310-73-2 | | 11 | | |
| Sulfuric acid | | 7664-93-9 | A1 R2 | 56 | X (10) | |

3. Attributable to Dyes and/or Pigments Production:

Our primary data sources in some cases may have included constituent information that reflects non-targeted production processes and wastes. For example, the TRI data includes all reporting at the targeted plants, many of which are in the business of producing a variety of product lines. Similarly, some of the plants we sampled manufactured products other than the targeted dyes and pigments. As a result, not all of the constituents detected in these wastes or reported to be released are necessarily associated directly with relevant dyes and/or pigments production. Prior to the 1994 proposal, we discussed this issue with the facilities we sampled in a series of "one-on-one" meetings in New York and Florida. While the notes from these meetings are CBI, some of the public commenters discussed this issue in their non-CBI comments. See for example, Hoechst Cellanese's (HCC) comments dated December 14, 1995:

> "EPA has not established that the wastes generated by Azo dye and Azo pigment production can be expected to contain the compounds of concern (COCs) that were the basis for the listing. The wastewater treatment systems at HCC's facilities handle wastes generated both in the Azo dye and Azo pigment production operations as well as other operations at the plants. Before EPA can use HCC data to characterize particular wastestreams, it must assure that a particular COC is attributed to the appropriate manufacturing process." (p. vi)

To address this type of concern, we screened the primary list of constituents to determine whether these compounds are actually associated with production of the targeted dyes and pigments.

We developed a series of non-CBI ways of determining whether the remaining compounds on the primary list were closely associated with the manufacture of the targeted dyes and pigment products. Specifically, we examined each of the following publicly available sources to ascertain whether they linked the compounds on the primary list to dyes and/or pigments production.

- The Colour Index, noting those chemicals that are identified as intermediates or raw materials for azo, TAM or anthraquinone dyes or pigments that are produced in the United States
- Kirk-Othmer Encyclopedia of Chemical Technology
- The Toxics Release Inventory Forms R and A reports from those plants thought to be manufacturing the targeted dyes and pigments of concern (see Attachment 3)
- Merck Index, 11th edition, 1989
- Hawley's Condensed Chemical Dictionary, 12th edition.

The following sections describe the compounds that we dropped because we did not find sufficiently compelling linkage to current production of the targeted dyes and pigments.

a. No documented linkage to current U.S. manufacture

We eliminated compounds that were not reported to be associated with dyes or pigments manufacture in any of the publicly available sources previously described, although they were detected in either EPA's record sampling or CPMA's split sample compilation. We assume these compounds were detected in the wastes due to other out-of-scope processes at these sites.

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Toxicity Benchmark |
|---|---|---|---|---|---|
| Beryllium | | 7440-41-7 | 1 | 2 | X |
| Bromoform | tribromomethane | 75-25-2 | | 1 | X |
| Carbon disulfide | | 75-15-0 | | 2 | X |
| m-Cresol | 3-methylphenol | 108-39-4 | | 3 (19) | RTI-YES (for mixed cresols) |
| Dibromomethane | Dibromethane, methylene bromide | 74-95-3 | 1 | 2 | X |
| 1,3-Dichlorobenzene | m-dichlorobenzene | 541-73-1 | 1 | | IRIS |
| 1,4-Dichlorobenzene* | p-dichlorobenzene | 106-46-7 | 2 | | X |
| 2-Hexanone | | 591-78-6 | | 1 | HSDB |
| 3-Nitroaniline | m-nitroaniline | 99-09-2 | 1 | | HSDB |
| Pyrene | | 129-00-0 | 2 | 2 | X |
| Silver | | 7440-22-4 | | (20) | X |
| Styrene | Ethenylbenzene | 100-42-5 | | 1 | X |
| Thallium | | 7440-28-0 | | (20) | X |
| 1,2,4-Trichlorobenzene | | 120-82-1 | 5 | | RTI-YES |
| 2,4,6-Trichlorophenol | | 88-06-2 | 1 | | X |

*1,4-dichlorobenzene is mentioned in Kirk-Othmer and Hawleys as being associated with dyes and/or pigments production, although the references are general.

b. EU Ban compounds not linked to current U.S. manufacture

We eliminated the following compounds that are identified in the EU Directive 76/769/EEC related to azo colorants because we found no reason to believe that these compounds are still in use in the U.S. They were not detected in our waste analyses or CPMA's split sample analyses; they were not reported in the RY2000 TRI or the §3007 questionnaire. We did not find any U.S. producers of dyes or pigments of concern derived from these compounds in the Colour Index. Although some of these compounds have references in Hawley's Condensed Chemical Dictionary, these references are vague.

| | Synonyms | CAS # | Colour Index | EU Ban | Hawley/ Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|
| 2-aminoazotoluene | o-aminoazotoluene, 3,2-amino-5-azotoluene, 4-amino-2,3'-dimethylazobenzene, toluazotoludine | 97-56-3 | No entry | XX | H | RTI-YES |
| 4-aminobiphenyl | 4-aminodiphenyl, p-xenylamine, biphenyl-4-ylamin | 92-67-1 | No US manuf. (see p. 4752) | XX | | RTI-YES |

| | Synonyms | CAS # | Colour Index | EU Ban | Hawley/ Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|
| 4-chloro-2-methylaniline | 4-chloro-o-toluidine | 95-69-2 | No US manuf. (see p. 4857) | XX | H (vague) | RTI-YES |
| 4-methoxy-m-phenylenediamine | 2,4-diaminoanisole | 615-05-4 | No US manuf. (see p. 4821) | XX | | RTI-YES |
| 4,4'-methylene-bis(2-chloroaniline) | 3,3'-dichloro-4,4'-diamino-diphenylmethane, p,p'-methylene-bis-o-chloroaniline | 101-14-4 | No entry | XX | | RTI-YES |
| 4,4'-methylenedi-o-toluidine | | 838-88-0 | No entry | XX | | RTI-YES |
| 2-naphthylamine* | | 91-59-8 | No US production (see p. 4807) | XX | H, M (10) | RTI-YES |
| 4,4'-oxydianiline | bis(4-aminophenyl)ether | 101-80-4 | No entry | XX | | RTI-YES |
| 4,4'-thiodianiline | | 139-65-1 | No US manuf. (see p. 4704) | XX | | RTI-YES |
| 2,4,5-trimethylaniline | pseudocumidine, 1,2,4-trimethyl-5-aminobenzene | 137-17-7 | No US manuf. (see p. 4826) | XX | H | RTI-NO |

* The Colour Index provides the following note: "β- or 2-Naphthylamine is not now usually used as such because of its carcinogenic properties. Frequently 2-amino-1-naphthylene-sulfonic acid is used in its place, the sulfonic acid group being readily removed in the course of reaction."

### c. Limited TRI reporting

We dropped the following compounds because of limited reporting in the TRI. Each of these compounds were reported by Eastman Chemical, which is a large, integrated manufacturing facility with minimal dye and/or pigment production. None of our sources specifically link these compounds to the production of dyes and/or pigments, and we think it is likely that Eastman reports these compounds as a result of other non-colorant manufacturing at its facility. While ethylbenzene and methyl isobutyl ketone were also reported by AC&S (Nitro, WV) and Bayer (Bushy Creek, SC), respectively, these compounds are typically used as solvents and their disposal is already regulated as such under F003.

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | TRI | Toxicity Benchmark |
|---|---|---|---|---|---|---|
| Antimony | | 7440-6-0 | | 1 | R1 (Eastman) | X |
| Diethylhexylphthalate | DEHP, bis(2-ethylhexyl) phthalate, di(2-ethylhexyl) phthalate | 117-81-7 | 3 | 1 | R1 (Eastman) | X |
| Ethylbenzene | | 100-41-4 | 1 | 3 | R2 (AC&S, Eastman) | IRIS |
| Methyl isobutyl ketone | 4-methyl-2-pentanone; MIBK | 108-10-1 | 3 | 2 | R2 (Bayer, Eastman) | X |
| 1,2,4-Trimethylbenzene | pseudocumene | 95-63-6 | 3 | | R1 (Eastman) | HSDB |
| Vanadium | | 7440-62-2 | 3 | 2 | R1 (Eastman) | X |
| Dibutyl phthalate | di-n-butyl phthalate | 84-74-2 | 1 | | R1 | X |

We also dropped mercury and benzene due to similar minimal reporting. We dropped mercury because the comments argued that our analytical data reflected only trace analyses (not levels reflective of usage). In addition, While there was limited reference to benzene in one public comment and in the Merck index, both references are vague and do not provide support that benzene is used in making the targeted dyes or pigments. Mercury and benzene are TC constituents and otherwise already regulated.

| | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | TRI | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|
| Mercury | 7439-97-6 | 1 | 3 | 1 | R3 | | IRIS |
| Benzene | 71-43-2 | 5 | 4 | 1-vague | R1 | X (10) | RTI-YES |

d. Infrequently reported in §3007 questionnaire

We eliminated the following compounds because they were only reported in the §3007 questionnaire in one waste, or only at one or two facilities. We believe that the rarity of these compounds keeps them from being good candidates for risk assessment or for setting regulatory limits in dyes or pigments wastes industry-wide. Note that the majority of the compounds in this table that were detected in EPA's record sampling or CPMA's split sample compilation are regulated by the TC (cadmium, chloroform, methyl ethyl ketone, selenium, trichloroethylene).

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|
| Benzoic acid | benzene carboxylic acid | 65-85-0 | | | | 2 hits, 1 facility | IRIS |
| Bromodichloromethane | dichlorobromomethane | 75-27-4 | | 1 | | 1 | X |
| 2-Butoxy ethanol | | 111-76-2 | | | | 10 hits, 1 facility | RTI-YES |
| Butyric acid | | 107-92-6 | | | | 1 | HSDB |
| Chloranil | p-chloranil; tetrachloro-1,4-benzoquinone | 118-75-2 | | | | 2 hits, 1 facility | HEAST |
| 2,6-Dimethylaniline* | 2,6-xylidine | 87-62-7 | 1 (74) | | | 6 hits (mixed 2,4-/2,6-), 1 facility | HEAST |
| 4,6-Dinitro-o-cresol | Dinitrocresol; 4,6-dinitro-2-methylphenol; 2-methyl-4,6-dinitrophenol | 534-52-1 | | | | 1 | HSDB |
| 2,4-Dinitrophenol***** | | 51-28-5 | | | 1 | 2 hits, 1 facility | IRIS/RTI-YES |
| Ethylene diamine | | 107-15-3 | | | | 11 hits, 1 facility | IRIS |
| 2-Ethoxyethanol | | 110-80-5 | | | | 3 hits, 1 facility | IRIS |
| Ethyl acetate** | | 141-78-6 | | | | 2 hits, 1 facility | IRIS |
| n-Hexane | | 110-54-3 | | | | 2 hits, 1 facility | IRIS |
| 2-Methoxyethylamine | | 109-85-3 | | | | 1 | |
| 4-Methylnitrobenzene | PNT; p-nitrotoluene | 99-99-0 | | | | 1 | HEAST |
| Molybdenum | | 7439-98-7 | | | | 1 | IRIS |
| 4-Nitrophenol | p-nitrophenol | 100-02-7 | | | | 2 hits, 1 facility | RTI-NO |
| Paraformaldehyde | polymer form of | 30525-89-4 | | | | 1 | HSDB |

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|
| | formaldehyde | | | | | | |
| Strontium | | 7440-24-6 | | | | 1 | IRIS |
| Tin | | 7440-31-5 | | | | 3 hits, 1 facility | HEAST |
| TC Constituents: | | | | | | | |
| Cadmium | | 7440-43-9 | 1 | 2 | 1 (trace) | 5 hits, 2 facilities | IRIS |
| Chloroform | trichloromethane | 67-66-3 | 6 | 3 | | 1 | X |
| Methyl ethyl ketone*** | 2-butanone; MEK | 78-93-3 | | 5 | | 2 hits, 1 facility | IRIS |
| Selenium | | 7782-49-2 | 1 | (20) | 1 | 2 hits, 1 facility | IRIS |
| Trichloroethylene**** | trichloroethene, 1,1,2-trichloroethylene | 79-01-6 | 1 | | | 1 | X |

* Studied by EU in the context of Directive 76/768/EEC: SCCNFP/0495/01, Opinion of the Scientific Committee on Cosmetic Products and Non-Food Products Intended for Consumers concerning "The Safety Review of the Use of Certain Azo-Dyes in Cosmetic Products", 2/27/02. http://europa.eu.int/comm/food/fs/sc/sccp/out155_en.pdf
**Regulated under F003 when used as a solvent.
***Regulated under F005 when used as a solvent.
****Regulated under F001 when used as a solvent.
***** While Merck generically links this compound to dyes and pigments production, both the Colour Index and Hawleys more specifically link it to sulfur dye production, which is not within the scope of the listing determination.

e. Limited TRI linkage/survey

We dropped the following compounds because they were only reported in one or two surveys and by a limited number of facilities in the TRI. None of these compounds have Colour Index entries as intermediates used by U.S. manufacturers. Note that arsenic is already regulated by the TC.

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | TRI | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|
| Acetonitrile | methyl cyanide | 75-05-8 | | | | R1 (Eastman) | 1 | IRIS |
| Arsenic | | 7440-38-2 | 2 | 1 | 1 | R1 (Eastman) | 5 hits, 2 facilities | X |
| Chloromethane | methyl chloride | 74-87-3 | 2 | | | A1 (Blackman), R1 (Bayer) | 3 hits, 1 facility | RTI-YES |
| Diethyl sulfate | | 64-67-5 | | | | A1 (Clariant, Martin), R1 (Nation Ford) | 2 hits, 1 facility | IRIS |
| N,N-Dimethyl formamide | DMF | 68-12-2 | | | | R2 (Bayer, Eastman) | 3 hits, 1 facility | IRIS |
| Ethylene glycol | | 107-21-1 | | | | A2 (Abbey, Blackman), R6* | 1 | IRIS |
| Manganese | | 7439-96-5 | | | | A1 (Clariant/ Coventry), R3** | 2 hits, 2 facilities | IRIS |

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | TRI | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|
| Pyridine | | 110-86-1 | New 1 | | 1 | R1 (Noveon) | 3 hits, 1 facility | IRIS |
| Triethylamine | N,N-Diethyl ethanamine | 121-44-8 | | | | R1 (Eastman) | 1 | IRIS |

*Clariant/Coventry, Eastman, Englehard, Noveon, Roma, Yorkshire
**Eastman, Noveon, Warner-Jenkinson/St. Louis

f. Coverage by existing Subtitle C regulations

We dropped the following compounds because they are typically used as solvents and their solvent usages are already regulated under the F001-F005 listings.

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | TRI | TAM CI | §3007 Q | Hawley/ Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | | 67-64-1 | 14 | 15 | | | 14 | | RTI-YES |
| Chlorobenzene, mono | | 108-90-7 | 5 | 7 | R2 | | 6 hits, 1 facility | | RTI-YES |
| Methylene chloride | Dichloromethane | 75-09-2 | 5 | 5 | R1 | | 7 | | IRIS |
| Toluene | | 108-88-3 | 3 | 6 | R2 | 1, solvent | 1 | H | RTI-YES |
| Xylene (mixed isomers) | Dimethylbenzene | 1330-20-7 | 1 | 7 | A1 R3 | | | H/M (vague) | RTI-YES |

Note that there are three compounds on Table 1 that also are widely used as solvents. These chemicals, however, also appear to have uses as raw materials in certain dyes or pigments production processes: p-cresol (Colour Index, intermediate for various azo compounds, including CI. 11855), 1,2-dichlorobenzene (Kirk-Othmer, used as a dye carrier), and methanol (various §3007 surveys).

We dropped chromium because it is a TC compound and is otherwise already regulated. Although it was detected in waste samples, chromium is a widely used chemical that can show up in wastewater treatment systems from a variety of sources. In addition, although it was reported in the TRI, only two companies reported releases to land: an Englehard subsidiary (a manufacturer of inorganic pigments), and Eastman.

| | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | TRI | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|
| Chromium | 7440-47-3 | 4 | 6 | 1 (CKC) | R2 | 3 hits, 2 facilities | IRIS |

We also dropped nickel. The §3007 data from three facilities, when examined in detail, provides little link to targeted manufacturing. Specifically, the first site's data reflects very low

levels in their POTW wastewater discharge (<100 ppb). The second site's data reflects one sludge waste analysis (repeated three times as representative of the wastes generated from three different processes) at 93 ppm total, 0.83 mg/L TCLP, but the survey provided no additional information explaining whether nickel was intentionally used in dyes or pigments manufacturing processes. For the third site, the three hits reported included air emission data from two stacks, and a "fines" waste that contained 6 pounds of nickel in the reporting year. The fines, however, were reported to be characteristically hazardous due to TC metals from other non-target sources.

| | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | TRI | §3007 Q | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|
| Nickel | 7440-02-0 | 2 | 3 | 1 | R1 | 8 hits, 3 facilities | IRIS |

g. Triarylmethane raw materials

We dropped the following compounds because they were only on the core list because of our TAM Colour Index research, and that research only indicated that one TAM product is linked to each compound of concern.

| | Synonyms | CAS # | Colour Index | TAM CI | Toxicity Benchmark |
|---|---|---|---|---|---|
| Benzoic trichloride | benzotrichloride; trichlorotoluene; trichloromethylbenzene | 98-07-7 | X | 1 | RTI-YES |
| o-Chlorobenzaldehyde | | 89-98-5 | X | 1 | HSDB |
| Nitrobenzene | | 98-95-3 | X | 1 | RTI-YES |
| o-Nitrotoluene | | 88-72-2 | X | 1 | HSDB (3) |

h. Colour Index

We dropped chloroethane because it was only reported to be associated with dyes or pigments production in the Colour Index. Specifically, the Colour Index reports only one product derived from chloroethane (CI 24895) is currently in U.S. production (2 manufacturers). Only one facility reported chloroethane releases in the TRI. Similarly, we dropped cyclohexylamine because it was only reported in the Colour Index. One product (CI 62045) appears to be produced by 2 manufacturers.

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Colour Index | TRI | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|
| Chloroethane | ethyl chloride | 75-00-3 | | 1 | X | R1 | RTI-YES |
| Cyclohexylamine | | 108-91-8 | 2 | | X | | IRIS |

i. Hawleys

We dropped the following compounds because their Hawley's references were vague (not specifically linking the compounds to the production of azo, TAM or anthraquinone dyes or pigments). None of these compounds were reported to be intermediates of products of concern

in the Colour Index. In the case of m-dinitrobenzene, the commenter (ETAD) provided additional arguments against it's consideration, including lack of reporting in ETAD's survey of constituents used or found in ETAD's members' materials.

| | Synonyms | CAS # | EPA record sampling data | CPMA split sample data | Public Comments | §3007 Q | Hawley | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|
| Benzyl alcohol | | 100-51-6 | 1 | 1 | | 0 | X | RTI-YES |
| m-Dinitrobenzene | 1,3-Dinitrobenzene | 99-65-0 | | | 1 | 0 | X | X |
| Sodium nitrate | | 7631-99-4 | | | | 1 | X | IRIS |

j. Irrelevant coeluters

We dropped the following two compounds because they were not found to be associated with manufacture of the target dyes and pigments. These compounds were identified by the analytical laboratory that conducted the record sample analysis in the early 1990's as being compounds that co-eluted with other targeted compounds. None of our sources identified these compounds as being relevant, and commenters on the prior proposals confirmed this lack of linkage to the target chemicals.

| | Synonyms | CAS # | EPA record sampling data | Comments | Toxicity Benchmark |
|---|---|---|---|---|---|
| 1,2-Diphenylhydrazine | coelutes with azobenzene | 122-66-7 | 5 (30) | 2 | IRIS |
| N-Nitrosodiphenylamine | co-elutes with diphenylamine | 86-30-6 | 4 (29) | 1 | IRIS |

4. Availability of Toxicity Benchmarks

We researched the availability of toxicity values in two stages. OSW's Hazardous Waste Identification Division (HWID) conducted an initial screening effort which was preliminary in nature and only indicated whether the several references we used contained an entry for each constituent. HWID did not assess the usefulness of the entries for the purposes of establishing toxicity benchmarks for risk assessment. In a separate effort, OSW's Economic, Methods, and Risk Assessment Division (EMRAD) conducted research into the availability of useful benchmarks. This paper also reflects the results of EMRAD's research as of October 22, 2002 and December 3, 2002. The following codes were used in the spreadsheet and in this report:

"X" indicates a toxicity value for human health benchmarks is reported in Table C-1 of the *Guide for Industrial Waste Management; Input Parameter Values for the Industrial D Tier 1 Tool; September, 2001.*

"IRIS" indicates some type of IRIS entry.

"Cal-EPA" indicates that the California Environmental Protection Agency has developed

relevant chronic inhalation reference exposure levels (RELs) or cancer potency factors.

"HSDB" indicates an entry exists in Toxnet's Hazardous Substance Data Bank.

A1= Confirmed human carcinogen
A2= Suspected human carcinogen
A4= Not classifiable as a human carcinogen
2B= The agent is possibly carcinogenic to humans
3= The agent is not classifiable as to its carcinogenicity to humans; animal carcinogen
C=No evidence in humans and limited evidence in animals.
No subcode indicates an entry exists, but the compound is not identified as a carcinogen.

"RTI-YES" indicates that EMRAD's risk assessment contractor, Research Triangle Institute (RTI), identified an adequate toxicity benchmark for the purposes of conducting the risk assessment

"RTI-NO" indicates that RTI researched the compound but found insufficient information to support calculation of a toxicity benchmark.

We eliminated those compounds for which we were unable to identify toxicity benchmarks. As previously described, we conducted initial screening by conducting an internet search of IRIS, HEAST, and HSDB. A more exhaustive review was conducted by EMRAD's contractor, RTI, for some of the compounds.

These compounds are divided into four categories:

- Compounds with HSDB entries that RTI did not research
- Compounds with HSDB entries that RTI researched and for which no toxicity benchmarks were identified
- Compounds with no IRIS, HEAST, or HSDB entries that RTI researched and for which no toxicity benchmarks were identified
- Compounds with no IRIS, HEAST, or HSDB entries that RTI did not research.

Note that very few of these compounds would clear the screening criteria described above if toxicity benchmarks were in fact available.

| Chemical Compound | Synonyms | CAS | EPA record sampling data | CPMA split sample data | Public Comments | Colour Index (1) | TRI | Kirk-Othmer (2) | EU Ban | Non-CBI §3007 waste data | Hawley | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONSTITUENTS WITH NO IRIS OR HEAST VALUES: HSDB ENTRIES ONLY (RTI did not research) | | | | | | | | | | | | |
| Acetic acid | | 64-19-7 | | | | | | | | 58 | X | HSDB |
| 4-Aminoazobenzene | aniline yellow, phenylazoaniline | 60-09-3 | | | | X | | X (azo) | XX | | X | HSDB (2B) |
| Anthranilic acid | 2-Aminobenzoic acid | 118-92-3 | | | | X | | | | 8 | | HSDB (3) |
| L-Aspartic acid | D salt | 56-84-8 | | | | | | | | 10 | | HSDB |
| 2-Bromo-4,6 dinitroaniline | | 1817-73-8 | 1 | 1 | 1 | | | | | 2 | | HSDB |
| Diethylamine | | 109-89-7 | | | | | | | | 1 | X | HSDB (A4) |
| Ethanolamine | | 141-43-5 | | | | X | | | | 1 | | HSDB |
| Ethyl alcohol | Ethanol | 64-17-5 | | | | | | | | 17 | X | HSDB (A4) |
| Ethylamine | | 75-04-7 | | | | | | | | 3 | X | HSDB |
| Ethyl cyanoacetate | | 105-56-6 | | | | | | | | 1 | X | HSDB |
| Ethylene glycol, monopropyl ether | | 2807-30-9 | | | | | | | | 5 | | HSDB |
| Iron | | 7439-89-6 | | | | | | | | 8 | | HSDB (A4) |
| Isopropyl alcohol | | 67-63-0 | | | | | | | | 3 | | HSDB |
| Methanesulfonic acid | | 75-75-2 | | | | | | | | 2 | | HSDB |
| Methylamine | | 74-89-5 | | | | | | | | 1 | X | HSDB |
| Morpholine | | 110-91-8 | | | | | | | | 2 | | HSDB (3) |
| 4-Nitroaniline | p-nitroaniline | 100-01-6 | 1 | | | X | A1 | | | | | HSDB (A4) |
| Oxalic acid | | 144-62-7 | | | | X | | | | 3 hits, 1 facility | | HSDB |
| p-Phenylphenol | 4-phenylphenol; 4-hydroxybiphenyl | 92-69-3 | | | | | | X | | 2 | | HSDB |
| phosphorus oxychloride | | 10025-87-3 | | | | | | | | 1 | | HSDB |
| phosphorus trichloride | | 7719-12-2 | | | | | | | | 2 | X | HSDB |
| Propionic acid | | 79-09-4 | | | | | | | | 7 | | HSDB |
| Salicylic acid | o-hydroxybenzoic acid | 69-72-7 | | | | X | | X | | 4 | X | HSDB |
| Sulfamic acid | | 5329-14-6 | | | | | | | | 12 | X | HSDB |
| Tobias acid | 2-Amino-1-naphthalenesulfonic acid; 1-Sulfonic acid | 81-16-3 | | | | X | | | | 4 | | HSDB |
| Triethanolamine | | 102-71-6 | | | | | | | | 3 | | HSDB |
| Urea | | 57-13-6 | | | | | | | | 5 | | HSDB |

| Chemical Compound | Synonyms | CAS | EPA record sampling data | CPMA split sample data | Public Comments | Colour Index (1) | Kirk-Othmer (2) | EU Ban (73) | TAM Colour Index | Non-CBI §3007 waste data | Hawley/ Merck (4) | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONSTITUENTS WITH NO IRIS OR HEAST VALUES (RTI researched, but found no toxicity benchmarks) | | | | | | | | | | | | |
| Acetoacetanilide | | 102-01-2 | 9 | (20) | 6 | X | X | | | 5 | H | HSDB/RTI-NO |
| o-Acetoacetanisidide | acetoacet-o-anisidide, AAOA | 92-15-9 | 4 | 2 | 6 | X | X | | | 6 | | RTI-NO |
| Acetoacetic Acid | 3-oxobutanoic acid, Acetoacetate | 541-50-4 | | | | | | | | 8 | | RTI-NO |
| o-Acetoacetotoluidide | AAOT | 93-68-5 | New 6 | 1 | 6 | X | X | | | 5 | | RTI-NO |
| Acetoacet-M-xylidide | AAMX; m-Acetoacetoxylidide | 97-36-9 | | | | | | | | 23 | | RTI-NO |
| 3-Aminoacetanilide | | 102-28-3 | 4 | 1 | | | | | | 4 | | RTI-NO |
| 5-Amino-2[(4-aminophenyl)amino] benzenesulfonic aicd | 4,4'-diamino-diphenylamine-2'-sulfonic acid | 119-70-0 | | | | | | | | 7 | | RTI-NO |
| 1-Aminoanthraquinone | | 82-45-1 | | 2 | | X | | | | 2 | M (10) | RTI-NO |
| 7-Amino1,3-naphthalenedisulfonic acid, monopotassium salt monohydrate | | 842-15-9 | | | | | | | | 1 | | RTI-NO |
| 2-Amino-4-chloro-5-methylbenzene sulfonic acid | 2B acid | 88-51-7 | | | | | | | | 3 | H | HSDB/RTI-NO |
| 4-4'-bis(diethylamino)benzophenone | | 90-93-7 | | | | | | | 1 | 0 | | RTI-NO |
| 4-4'-bis(dimethylamino)benzhydrol | | 119-58-4 | | | | | | | 2 | 0 | | RTI-NO |
| 4-Chloro-2-nitroaniline | | 89-63-4 | | (20) | | X | | | | 7 | H | HSDB/RTI-NO |
| 2-Chloro-4-nitroaniline | | 121-87-9 | 1 | | | X | | | | 0 | H | HSDB/RTI-NO |
| N,N-Diethylaniline | | 91-66-7 | | | | X | X | | 1 | 5 | H | HSDB/RTI-NO |
| 1,4-Dihydroxyanthraquinone | quinizarin | 81-64-1 | | | | X | X | | | 6 | H | RTI-NO |
| 4,5-dihydroxy-2,7-naphthalene-disulfonic acid, disodium salt dihydrate | | 129-96-4 | | | | | | | | 1 | | RTI-NO |
| 2,4-Dinitroaniline | | 97-02-9 | 1 | 1 | | X | | | | 0 | H | HSDB/RTI-NO |
| N-ethyl-N-phenylbenzylamine | | 92-59-1 | | | | | | | 3 | 0 | | HSDB/RTI-NO |
| Ethylenediaminetetraacetic acid tetrasodium salt | EDTA tetrasodium salt | 10378-23-1 | | | | | | | | 1 | | RTI-NO |
| N-ethyl-1-naphthylamine | | 118-44-5 | | | | | | | 1 | 0 | | RTI-NO |
| Gamma acid | 6-amino-4-hydroxy-2-naphthalenesulfonic acid | 90-51-7 | | | | | | | | 6 | | RTI-NO |
| p-hydroxybenzaldehyde | | 123-08-0 | | | | | | | 1 | 0 | | RTI-NO |
| 2-Hydroxynaphthalene | 2-naphthol, Beta naphthol | 135-19-3 | 7 | 3 | | | | | | 17 | H | HSDB/RTI-NO |
| 3-hydroxy-2-naphthoic acid | Bon acid | 92-70-6 | | | | | | | | 6 | H | HSDB/RTI-NO |
| 3-Hydroxyphenol | resorcinol | 108-46-3 | 1 | | | X | | | | 3 | H/M (10) | HSDB (3)/ RTI-NO |
| Isopropylamine | | 75-31-0 | | 1 | | X | | | | 0 | H | HSDB/RTI-NO |
| 2-Methoxy-4-nitroaniline | Fast Red B Base, 4-nitro-o-anisidine | 97-52-9 | | | | X | | | | 5 | | RTI-NO |
| 3-Methylaniline | m-toluidine, 3-aminotoluene | 108-44-1 | 9 (25) | | 3 | X | | | | 0 | H/M(10) | HSDB/RTI-NO |
| 2-naphthal-3,6-disulfonic acid | R salt | 135-51-3 | | | | | | | | 8 | | RTI-NO |

| Chemical Compound | Synonyms | CAS | EPA record sampling data | CPMA split sample data | Public Comments | Colour Index (1) | Kirk-Othmer (2) | EU Ban (73) | TAM Colour Index | Non-CBI §3007 waste data | Hawley/ Merck (4) | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| disodium salt | | | | | | | | | | | | |
| 1-Naphthylamine | 1-aminonaphthalene, a-naphthylamine | 134-32-7 | 1 | | | X | | | | 0 | H/M(10) | HSDB/RTI-NO |
| 2-Nitro-p-anisidine | 4-Methoxy-2-nitroaniline | 96-96-8 | | | | | | | | 2 | | RTI-NO |
| 2-Nitrophenol | o-Nitrophenol | 88-75-5 | 1 | | | | | | | 3 | | HSDB/RTI-NO |
| 2,2'-Oxybisethanol | Diethylene glycol; DEG | 111-46-6 | | | | | | | | 7 | H | HSDB/RTI-NO |
| N-phenyl-1-naphthylamine | | 90-30-2 | | | | | | | 2 | 0 | | RTI-NO |
| Sulfanilic acid | | 121-57-3 | | | | X | | | | 7 | H | HSDB/RTI-NO |
| p-Toluidine-m-sulfonic acid | 5-Amino-2-methylbenzene sulfonic acid | 118-88-7 | | | | | | | | 3 | | RTI-NO |
| 2,2,4-Trimethyl-1,3-pentanediol isobutyrate | Texanol | 25265-77-4 | | | | | | | | 1 | | RTI-NO |

| Chemical Compound | Synonyms | CAS | EPA record sampling data | Colour Index (1) | Kirk-Othmer (2) | TRI (3) | TAM Colour Index | Non-CBI §3007 waste data | Merck (4) | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|
| CONSTITUENTS WITH NO IRIS, HEAST, or HSDB VALUES: (RTI has not researched) | | | | | | | | | | |
| 4'-Aminoacetanilide | acetyl-p-phenylene-diamine | 122-80-5 | | | X | | | 1 | | |
| 2-Amino-5-nitrobenzenesulfonic acid | | 4346-51-4 | | X | | | | 3 | | |
| p-[(p-aminophenyl)azo] benzenesulfonic acid | | 104-23-4 | | X | X | | | 1 | | |
| Arsenazo I & II | | 3547-38-4; 520-10-5 | | | | | | 5 | | |
| Arsenazo III | | 1668-00-4 | | | | | | 5 | | |
| Benzoyl chloride | | 98-88-4 | | X | | R1 | | 2 | X (23) | |
| Bis(2-methoxy ethyl)ether | DiGlyme | 111-96-6 | | | | | | 2 | | |
| Bromoethane | | 74-96-4 | | X | | | | 2 hits, 1 facility | | |
| Bromothymol blue | | 76-59-5 | | | | | | 2 | | |
| Celite | Diatomaceous silica, flux-calcined | 68855-54-9 | | | | | | 1 | | |
| Cerelose | glucose | 50-99-7 | | | | | | 3 | | |
| p-chlorobenzaldehyde | | 104-88-1 | | | | | 1 | 0 | | |
| 2-chloro-4,6-dinitrobenzenamine | 6-chloro-2,4-dinitroaniline | 3531-19-9 | | X | | | | 1 | | |
| 2-chloro-5-nitrobenzenesulfonic acid | | 96-73-1 | | | | | | 2 | | |
| 2,3-cresotic acid | | 83-40-9 | | | | | 1 | 0 | | |
| Dehydrothio-p-toluidine sulfonic acid | | 130-17-6 | | | | | | 5 | | |
| 1,3-Diaminobenzene-4-sulfonic acid | 2,4-Diamino-benzenesulfonic acid | 88-63-1 | | | | | | 8 | | |
| 4,4'-Diamino-2,2'-stilbenedisulfonic acid | 4,4'diaminostilbene-2,2'-disulfonic acid | 81-11-8 | | X | | | | 1 | | |

| Chemical Compound | Synonyms | CAS | EPA record sampling data | Colour Index (1) | Kirk-Othmer (2) | TRI (3) | TAM Colour Index | Non-CBI §3007 waste data | Merck (4) | Available Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|
| Dicalite | Dimatomaceous silica, flux-calcinated | 68855-54-9 | | | | | | 4 hits, 1 facility | | |
| 2,6-dichlorobenzaldehyde | | 83-38-5 | | | | | 1 | 0 | | |
| N,N-Diethyl-o-toluidine | | 606-46-2 | | | | | | 1 | | |
| 4,5-dihydroxy-2,7-naphthalene disulfonic acid, disodium salt, dihydrate | Chromotropic acid | 5808-22-0 | | X | | | | 5 | | |
| 3,5-Dimethoxy-4-butoxy-phenethylamine | Beta salt | 64778-75-2 | | | | | | 6 | | |
| p-dimethylaminobenzaldehyde | | 100-10-7 | | | | | 1 | 0 | | |
| N-ethyl-o-toluidine | | 94-68-8 | | | | | | 3 | | |
| G salt | | 842-18-2 for G acid | | X | | | | 3 hits, 1 facility | | |
| H acid | 4-amino-5-hydroxy-2,7-naphthalenedisulfonic acid | 5460-09-3 | | X | | | | 30 | | |
| J acid | 2-amino-5-naphthol-7-sulfonic acid | 87-02-5 | | X | | | | 9 | | |
| Lithium hydroxide | | 1310-65-2 | | | | | | 6 | | |
| Metanilic acid | m-aminobenzenesulfonic acid | 121-47-1 | | X | X | | | 19 | | |
| N-methyltaurine | | 107-68-6 | | | | | | 1 | | |
| 2,7-naphthalenedisulfonic acid | | 92-41-1 | | | | | 1 | 0 | | |
| Octanol | | 29063-28-3 | | | | | | 2 | | |
| Orthanilic acid | 2-Aminobenzenesulfonic acid | 88-21-1 | | X | | | | 7 | | |
| Pararosaniline base | | 25620-78-4 | | | | | | 1 | | |
| Petroleum ether | | 8032-32-4/68476-50-6 | | | | | | 2 | | |
| Petroleum naphtha (Soltrol) | Petroleum ether; hydrocarbon mixture | 8032-32-4 | | | | | | 3 | | |
| p-phenetidine | | 156-43-4 | | | | | 1 | 0 | | |
| Rosolic acid | | 603-45-2 | | | | | | 3 hits, 1 facility | | |
| Sodium cyanate | | 917-61-3 | | | | | | 3 | | |
| Sodium dimethyldithiocarbamate | | 128-04-1 | | | | | | 2 | | |
| 5-Sulfoanthranilic acid | | 3557-63-7 | | X | | | | 8 | | |
| Tetrabromophenol blue | | 4430-25-5 | | | | | | 2 | | |
| Thymol blue | | 76-61-9 | | | | | | 1 | | |
| 1,2,3-Trichlorobenzene | | 87-91-6 | 1 | | | | | 0 | | |
| Triton X-100 | | 9002-93-1 | | | | | | 1 | | |
| Vinsol | Rosin, sodium salt; rosin, sodium soap; dresinate | 61790-51-0 | | | | | | 1 | | |
| Xylene cyanole FF | 1,2-benzenedisulfonic acid, 4-[[4-ethylamino)-3-methylphenyl][4-(ethylimino)-3-methyl-2,5-cyclohexadien-1-ylidene]methyl]-, monosodium salt | 2650-17-1 | | | | | | 1 | | |
| Sulfonated castor oil | Turkey red oil | 8002-33-3 | | | | | | 4 | | |

TABLE NOTES

(1) Colour Index 2.0, Intermediates Database, Third Edition, July 1999.
(2) Kirk-Othmer, Encyclopedia of Chemical Technology, Third Edition, Volume 8 (Diuretics to Emulsions), 1979. Constituents are identified as either a Dye carrier or a cyclic intermediate. Dye carriers are used to achieve complete dye penetration of polyester fibers. Cyclic intermediates or dye intermediates are precursors of dyes used by the dye industry.
(3) TRI data for RY2000 for facilities that may be manufacturing dyes, pigments, or FD&C colorants of concern. A=Form A, R=Form R, #=number of forms
(4) Merck Index, Eleventh Edition, 1989.
(10) Merck Index identifies use in the manufacture of dyes.
(11) Merck Index identifies use in the manufacture of azo dyes.
(19) Reported as 3/4-methylphenol.
(20) Reported in list of substances identified above the reporting limit but not found in sample results.
(21) Merck Index identifies use in making indigo, indanthrene, and triphenylmethane dyes.
(23) Merck Index identifies use as dyestuff intermediate.
(25) Reported as 2-, 3-, & 4-aminotoluene.
(26) Samples reported concentrations for both o-toluidine and 2/4-aminotoluene.
(28) 2-aminoaniline, 4-aminoaniline, and 2-methoxyaniline coeluted and could not be separated.
(29) N-Nitroso-diphenylamine and diphenylamine could not be separated and were reported as diphenylamine.
(30) 1,2-diphenylhydrazine and azobenzene could not be separated and were reported as azobenzene.
(50) Merck Index identifies use in the manufacture of diazo dyes.
(71) See each constituent.
(73) EU Directive for a Community Ban on Azocolourants, EIC 76/769/EEC

# Attachment 1
# Codes used in Tables

| Table Column Headings | Explanation of Codes |
|---|---|
| EPA record sampling data | Number indicates the frequency of detection in EPA record samples, as summarized in Table 1 of the 2003 Magruder settlement agreement. Values in parentheses refer to footnotes (see Table Notes) |
| Split CPMA sample data | Number indicates the frequency of detection in industry split sample analyses of EPA record samples. Values in parentheses refer to footnotes (see Table Notes) |
| Public Comments | Number indicates the number of public comments providing some level of confirmation that the compound is present in the wastes (note that in some cases, the commenters argued that constituent presence was not related to the targeted processes of concern) |
| Colour Index | "X" indicates that the compound was reported to be a raw material or intermediate used to produce azo, TAM or anthraquinone products. For the 31 "keepers" we have confirmed that these products are reported to be manufactured in the US. |
| Kirk-Othmer | "X" indicates that Dynamac found some link to D&P production in this reference |
| TRI | The codes in this column refer to the number of Form R and Form A submitted by facilities known to be dye and pigment manufacturers. Form R is used for high volume chemicals. Form A is for low volume (<500 lb) compounds. |
| EU Ban | The European Union has banned the sale of azo dyes that can degrade into a variety of carcinogenic aromatic amines. "XX" indicates that the compound is one of the banned aromatic amines. |
| TAM Colour Index | The number of triarylmethane products manufactured in the US using this compound as a raw material or intermediate, as reported in the Colour Index. Note that multiple manufacturers may produce any given product. |
| Non-CBI §3007 waste data | The tally of wastes reported to contain a compound in the non-CBI portions of the §3007 surveys. In some cases, we note whether all of the "hits" were associated with a single facility's wastes. |
| Hawley | "X" or "H" indicates some linkage in the Condensed Chemical Dictionary to dye and pigment production |
| Merck | "X" or "M" indicates some linkage in Merck to dye and pigment production; footnotes provide some additional detail |
| Available Toxicity Benchmark | "RTI-YES" = RTI has reported a Toxicity Benchmark (TBM) in October 2002. "RTI-NO" = RTI looked for, but did not find any available TBM in 10/02. "X" = Dynamac's identification of tox data. "IRIS", "HEAST", and "HSDB" means that HWID found some level of entry in the IRIS, ORNL, and Toxnet databases (respectively), but does not necessarily mean that sufficient data exist to establish a TBM. |
| Footnotes | The footnotes, identified by numbers within parentheses, are provided as a separate attachment. |

# Attachment 2
# Constituents Culled from Primary List
# Due to CAS Number Unavailability

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Amino-2-sulfo-4-hydroxyanthraquinone | | CAS NA | | | | | | | 4 | | |
| 1-Amino-4-(3-amino-5-sulfo-2,4,6-trimethylphenylamino)-2-sulfoanthiaquinone | | CAS NA | | | | | | | 22 | | |
| 1-Hydroxy-3,6-dichlorotriazine | | CAS NA | | | | | | | 53 | | |
| 1-Hydroxynaphthalene-5-sulfonic acid | | CAS NA | | | | | | | 2 | | |
| 1-N-(1-hydroxy-3-chlorotriazine-6-Ylamino)-8-hydroxy-naphthalene-3,6-disulfonic acid | | CAS NA | | | | | | | 3 | | |
| 1-(2-carboxy-5-sulfophenylamino)-3-hydroxy-6-chlorotriazine | | CAS NA | | | | | | | 3 | | |
| 1-(2,4-disulfophenylamino)-3-hydroxy-6-chlorotriazine | | CAS NA | | | | | | | 3 | | |
| 1-(3-Hydroxy-2,5-disulfophenylamino)-3-hydroxy-6-chlorotriazine | | CAS NA | | | | | | | 3 | | |
| 1-(3-Hydroxy-5-sulfophenylamino)-3-hydroxy-6-chlorotriazine | | CAS NA | | | | | | | 3 | | |
| 1-(3-Sulfophenylamino)-3-hydroxy-6-chlorotriazine | | CAS NA | | | | | | | 13 | | |
| 1,2-Bis(4-nitro-2-sulfophenylamino)ethane | | CAS NA | | | | | | | 6 | | |
| 1,2-Diphenylhydrazine, Azobenzene | see individual entries | None | 5 (30) | | | | | | 0 | | X (71) |
| 1,2-Phenylenediamine, o-anisidine, p-phenylenediamine | see individual entries | None | 5 (28) | | | X | | | 0 | X (71) | |
| 1,3-Diacetylaminobenzene | | CAS NA | | | | | | | 1 | | |
| 1,3-Dihydroxy-6-chlorotriazine | | CAS NA | | | | | | | 53 | | |
| 1,3-Diureidoaniline | | CAS NA | | | | | | | 2 | | |
| 1,5-Naphthalenedisulfonic acid,2{1-hydroxy-6-(methylamino)-3-sulfo-2-naphthalenyl}azo | | CAS NA | | | | | | | 4 | | |
| 2-Amino-6-(methylsulfonyl)benzothiazole | | CAS NA | | | | | | | 1 | | |
| 2-Aminonaphthalene-3,6,8-trisulfonic acid | | CAS NA | | | | | | | 4 | | |
| 2-Anthracenesulfonic acid,1-amino-4-[3-amino-4-sulfophenyl)amino]-9,10-dihydro-9,10-dioxo | | CAS NA | | | | | | | 4 | | |
| 2-Hydroxynaphthalene-1,5-disulfonic acid | | CAS NA | | | | | | | 2 | | |
| 2-Hydroxynaphthalene-3,6,8-trisulfonic acid | | CAS NA | | | | | | | 3 | | |
| 2-Hydroxynaphthalene-5,8-disulfonic acid | | CAS NA | | | | | | | 2 | | |
| 2-Hydroxynaphthalene disulfonic acid | | CAS NA | | | | | | | 3 | | |

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-Methoxy-4-nitrophenol | | CAS NA | | | | | | | 3 | | |
| 2-naphthol-1,5-disulfonic acid | | CAS NA | | | | | | | 3 | | |
| 2-(2-Aminoethylamino)-5-nitrobenzenesulfonic acid | | CAS NA | | | | | | | 6 | | |
| 2-(aminophenyl)ethanolsulfate, mixed isomers | | CAS NA | | | | | | | 1 | | |
| 2-(p-hydroxyphenyl)-6-methyl-7-benzothiazole sulfonic acid | | CAS NA | | | | | | | 5 | | |
| 2,5-Dimethoxyphenylpropyl-4-toluenesulfonate | | CAS NA | | | | | | | 2 | | |
| 2,7-naphthalenedisulfonic acid,1-amino-3,6-bis(5-amino-2-sulfonphenylazo)-8-hydroxy-tetrasodium salt | | CAS NA | | | | | | | 5 | | |
| 2,7-naphthalenedisulfonic acid,5-amino-4-hydroxy-3-[(1-sulfo-2-naphthalenyl)azo]-trisodium salt | | CAS NA | | | | | | | 2 | | |
| 2/4 aminotoluene | o-/p-toluidine; see individual entries | None | 9 (25) | 6 (26) | | X | | | 0 | | X |
| 3-Methylaniline, o-toluidine, p-toluidine | see individual entries | None | 9 (25) | 6 (26) | | X | | | 0 | | X (71) |
| 3-N,N-Bisacetoxyethylamino-4-methoxyacetoanilide | | CAS NA | | | | | | | 2 | | |
| 3-[(4-amino-3-methoxyphenyl)azo] benzenesulfonic acid | | CAS NA | | | | | | | 1 | | |
| 3-[(4-hydroxy-3-methoxyphenyl)azo] benzenesulfonic acid | | CAS NA | | | | | | | 1 | | |
| 3(N,N-bishydroxyl-ethyl)amino-4-methoxyacetanilide | | CAS NA | | | | | | | 1 | | |
| 3(N,N-diethylamino)acetanilide | | CAS NA | | | | | | | 3 | | |
| 3,10-Bis(2'-aminoethylamino)-6,13-dichlorotriphendioxazine-4',11-disulfonic acid | | CAS NA | | | | | | | 6 | | |
| 3,3'-Dimethoxy-[1, 1'-biphenyl]-4 ,4'-dihydroxy | | CAS NA | | | | | | | 1 | | |
| 3,4,5,6-Tetrabromophenolsulfonephthalein | | CAS NA | | | | | | | 5 | | |
| 4-Amino-1,1'-azobenzene-3,4'-disulfonic acid | | CAS NA | | | | | | | 1 | | |
| 4-Amino-4'-nitrostilbene-2:2'-disulfonic acid | | CAS NA | | | | | | | 2 | | |
| 4'-chloro-2',5-dimethoxacetoacetanilide | | CAS NA | | | | | | | 1 | | |
| 4-formyl-m-benzenedisulfonic acid | | CAS NA | | | | | | 1 | 0 | | |
| 4-Nitro-4-aminostilbene-2,2-disulfonic acid | | CAS NA | | | | | | | 2 | | |
| 4-(3-Hydroxy-6-chlorotriazinyl) amino-4'-nitrostilbene-2,2'-disulfonic acid | | CAS NA | | | | | | | 7 | | |
| 4-[(p-hydroxyphenyl)azo] benzenesulfonic acid | | CAS NA | | | | | | | 1 | | |
| 4,4'-dihydroxystilbene-2,2'-disulfonic acid | | CAS NA | | | | | | | 1 | | |
| 4,4-Dinitrostilbene-2,2'-disulfonic acid | | CAS NA | | | | | | | 2 | | |
| 4,6-Diaminobenzene-1,3-disulfonic acid | | CAS NA | | | | | | | 2 | | |

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-Amino-2-hydroxybenzenesulfonic acid | | CAS NA | | | | | | | 2 | | |
| 6-Bromo-2,4,-dinitrophenol | | CAS NA | | | | | | | 1 | | |
| 6-Nitro-2-aminobenzothiazole | | CAS NA | | | | | | | 4 | | |
| 6-Nitro-2-hydroxybenzothiazole | | CAS NA | | | | | | | 1 | | |
| 8-Amino-2-(4,8-disulfo-1-hydroxy-2-naphthylazo-1-naphthol-3,6-disulfonic acid, Cu(II) complex,tetrasodium salt | | CAS NA | | | | | | | 3 | | |
| a-(N-ethylanilino)-m-toluenesulfonic acid | benzylethylanilinosulfonic acid | CAS NA | | | | | | 3 | 0 | | |
| AAOCA | | CAS NA | | | | | | | 2 | | |
| Acetoacetanisidine compounds | | None | | | | | | | 1 | | |
| Aceto-o-chloroanilide | | CAS NA | | | | | | | 2 | | |
| Acylated sulfonamido alcohol | | CAS NA | | | | | | | 2 | | |
| Alizarine | 1,2-dihydroxyanthraquinone | CAS NA | | | | | | | 5 | | |
| Alkanol | | CAS NA | | | | | | | 1 | | |
| Aminoanisole compounds | | None | | | | | | | 1 | | |
| Aminotoluene compounds | | None | | | | | | | 1 | | |
| Aniline-2,4-disulfonic acid | | CAS NA | | | | | | | 4 | | |
| APCO Thinner | | CAS NA | | | | | | | 4 | | |
| Benzaldehyde-2,4-disulfonic acid disodium salt | | CAS NA | | | | | | | 3 | | |
| Benzidenedisulfonic acid | | CAS NA | | | | | | | 4 | | |
| Beta oxynaphthoic aicd | | CAS NA | | | | | | | 5 | | |
| Bisacetoacetparamine acid | | CAS NA | | | | | | | 2 | | |
| Blanc Fixe | | CAS NA | | | | | | | 4 | | |
| Blancol | | CAS NA | | | | | | | 1 | | |
| Bromaminic acid | | CAS NA | | | | | | | 7 | | |
| C3 Benzenes | | None | | 3 | | | | | 0 | | |
| C4 Benzenes | | None | | 2 | | | | | 0 | | |
| Calcium dresinate | | CAS NA | | | | | | | 1 | | |
| Carbamoyl pyridone | | CAS NA | | | | | | | 4 | | |
| Cassela acid | | CAS NA | | | | | | | 3 | | |
| CC-76 | | CAS NA | | | | | | | 2 | | |
| Chloroaniline compounds | | None | | | | | | | 6 | | |
| Chloroethylamine hydrochloride | | CAS NA | | | | | | | 5 | | |
| Chromate(2-),bis[2-{(6-amino-1-hydroxy-3-sulfo-2-naphthalenyl)azo}benzoato(3-)] dihydrogen | | CAS NA | | | | | | | 9 | | |
| Copper[29H,31H-phthalocyaninato(2-)- | | None | | | | | | | 5 | | |

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N29,N30,N31,N32]-[(2-aminoethyl)amino]sulfonyl sulfo derivatives | | | | | | | | | | | |
| Cyan dye | | CAS NA | | | | | | | 3 | | |
| Cyanide compounds | | None | | | 1 | | | | 0 | | |
| Cyano pyridone | | CAS NA | | | | | | | 3 | | |
| DAMSA | | CAS NA | | | | | | | 3 | | |
| Darco - S51 (activated carbon) | | CAS NA | | | | | | | 5 | | |
| Diaminostilbene disulfonic acid | | CAS NA | | | | | | | 4 | | |
| Diphenylamine, N-Nitrosodiphenylamine | see individual entries | None | 4 (29) | | | X (71) | | | 0 | X (71) | X |
| Disperse Black 9 | | CAS NA | | | | | | | 3 | | |
| Disperse Blue 102 | | CAS NA | | | | | | | 3 | | |
| Disperse Blue 118 | | CAS NA | | | | | | | 1 | | |
| Disperse Blue 337 | | CAS NA | | | | | | | 4 | | |
| Disperse Blue 77 | | CAS NA | | | | | | | 3 | | |
| Disperse Brown 22 | | CAS NA | | | | | | | 2 | | |
| Disperse Orange 30 | | CAS NA | | | | | | | 2 | | |
| Disperse Orange 44 | | CAS NA | | | | | | | 3 | | |
| Disperse Red 136 | | CAS NA | | | | | | | 3 | | |
| Disperse Red 137 | | CAS NA | | | | | | | 2 | | |
| Disperse Red 30 | | CAS NA | | | | | | | 4 | | |
| Disperse Red 338 | | CAS NA | | | | | | | 3 | | |
| Disperse Red 88 | | CAS NA | | | | | | | 3 | | |
| Disperse Violet 91 | | CAS NA | | | | | | | 3 | | |
| Disperse Yellow 108 | | CAS NA | | | | | | | 3 | | |
| DNDB | | CAS NA | | | | | | | 3 | | |
| DNS | | CAS NA | | | | | | | 5 | | |
| DY-11 | | CAS NA | | | | | | | 2 | | |
| DY6 | | CAS NA | | | | | | | 2 | | |
| Dye polymer | | None | | | | | | | 3 | | |
| Dye product | | CAS NA | | | | | | | 15 | | |
| Ether | | CAS NA | | | | | | | 3 | | HSDB |
| Film fortifier? | | None | | | | | | | 2 | | |
| Filter media | | None | | | | | | | 1 | | |
| Filtercel ? (filter aid) | | CAS NA | | | | | | | 5 | | |
| Formula 556 | | CAS NA | | | | | | | 1 | | |
| hexamethylpararosaniline | | CAS NA | | | | | | 1 | 0 | | |
| Hydrolyzed dye; hydrolyzed MX dye | | CAS NA | | | | | | | 33 | | |
| Igepal | | CAS NA | | | | | | | 1 | | |

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Igepon T-77 | | CAS NA | | | | | | | 1 | | |
| Kaophile | | CAS NA | | | | | | | 3 | | |
| Leucoxylene cyanol | | CAS NA | | | | | | | 1 | | |
| Lithium ion | | None | | | | | | | 23 | | |
| m-Methyl-J-acid | | CAS NA | | | | | | | 3 | | |
| 1,3-phenylenediamine disulfonic acid | | CAS NA | | | | | | | 7 | | |
| m-Ureidoaniline | | CAS NA | | | | | | | 5 | | |
| Magenta dye | | CAS NA | | | | | | | 1 | | |
| Magenta filter dye | | CAS NA | | | | | | | 2 | | |
| Mixed organics (undefined) | | None | | | | | | | 1 | | |
| Mixed salts | | None | | | | | | | 2 | | |
| Mixed yellow pigments | | CAS NA | | | | | | | 4 | | |
| Mordant red 9 | | CAS NA | | | | | | | 3 | | |
| MNOA | | CAS NA | | | | | | | 2 | | |
| m/p-Cresol | 3/4-Methylphenol | None | | 3 (19) | | X | | | 0 | | X |
| N-B-Hydroxyethyl-1,2,3,4-tetrahydro-2,2,4,7-tetramethylquinoline ? | | CAS NA | | | | | | | 1 | | |
| n-Cyanoethyl-N-acetoxyethylaniline | | CAS NA | | | | | | | 2 | | |
| n-Cyanoethyl-N-hydroxyethylaniline | | CAS NA | | | | | | | 1 | | |
| N-Methylolcaprolactam | | CAS NA | | | | | | | 1 | | |
| n-Methylsulfonamide, reduced | | CAS NA | | | | | | | 1 | | |
| N-tetramethylpararosaniline | | CAS NA | | | | | | 1 | 0 | | |
| N-(2-acetoxyethyl)-N-(2-cyanoethyl)aniline | | CAS NA | | | | | | | 1 | | |
| Naphthoic acid compounds | | None | | | | | | | 1 | | |
| Naphthol compounds | | None | | | | | | | 1 | | |
| NBSA | | CAS NA | | | | | | | 2 | | |
| Nekal BX | | CAS NA | | | | | | | 1 | | |
| Neodol 91 | C9-11 alcohol | CAS NA | | | | | | | 4 | | |
| Nitrosylsulfamic acid | | CAS NA | | | | | | | 1 | | |
| Nitrosylfuric acid ? | | CAS NA | | | | | | | 1 | | |
| NOx | | None | | | | | | | 1 | | |
| Norit 211 (filter aid) | | CAS NA | | | | | | | 1 | | |
| o-Arsenilic acid | | CAS NA | | | | | | | 5 | | |
| o-formylbenzenesulfonic acid | | CAS NA | | | | | | 1 | 0 | | |
| Oleoresinous compounds | | CAS NA | | | | | | | 4 | | |
| Orange 5 | | CAS NA | | | | | | | 2 | | |
| Orange 6 | | CAS NA | | | | | | | 2 | | |
| p-aminoazocresol | | CAS NA | | | | | | | 1 | | |
| p-Aminophenoxyethanol | | CAS NA | | | | | | | 2 | | |

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| p-nitrophenoxyethanol | | CAS NA | | | | | | | 2 | | |
| pentamethylpararosaniline | | CAS NA | | | | | | 1 | 0 | | |
| Phenol-3-sulfonic acid | | CAS NA | | | | | | | 3 | | |
| Pigment 1 ? (a co-product) | | CAS NA | | | | | | | 3 | | |
| Pigment 3 ? (a co-product) | | CAS NA | | | | | | | 3 | | |
| Pigment blue 15:3 | | CAS NA | | | | | | | 8 | | |
| Pigment 2 ? (a co-product) | | None | | | | | | | 6 | | |
| Pigment Black 7 | | CAS NA | | | | | | | 2 | | |
| Pigment Green 10 | | CAS NA | | | | | | | 2 | | |
| Pigment orange 46 | | CAS NA | | | | | | | 3 | | |
| Pigment red 49:1 | | CAS NA | | | | | | | 4 | | |
| Pigment red 49:2 | | CAS NA | | | | | | | 1 | | |
| Pigment red 52:1 | | CAS NA | | | | | | | 3 | | |
| Pigment red 60:1 | | CAS NA | | | | | | | 3 | | |
| Pigment red 83 | | CAS NA | | | | | | | 3 | | |
| Pigment Red 104 | | CAS NA | | | | | | | 2 | | |
| Pigment Red 122 | | CAS NA | | | | | | | 2 | | |
| Pigment Red 177 | | CAS NA | | | | | | | 2 | | |
| Pigment Red 179 | | CAS NA | | | | | | | 2 | | |
| Pigment Red 202 | | CAS NA | | | | | | | 2 | | |
| Pigment red 48:1 | | CAS NA | | | | | | | 2 | | |
| Pigment red 48:2 | | CAS NA | | | | | | | 2 | | |
| Pigment Red 48:4 | | CAS NA | | | | | | | 2 | | |
| Pigment Violet 19 | | CAS NA | | | | | | | 2 | | |
| Pigment violet 5 | | CAS NA | | | | | | | 6 | | |
| Pigment yellow 13 | | CAS NA | | | | | | | 1 | | |
| Pigment yellow 17 | | CAS NA | | | | | | | 2 | | |
| Pigment yellow 5 | | CAS NA | | | | | | | 1 | | |
| Pigment yellow 3 | | CAS NA | | | | | | | 2 | | |
| Pigment Yellow 65 | | CAS NA | | | | | | | 2 | | |
| Pigments/particulates | | None | | | | | | | 10 | | |
| PNTSA | | CAS NA | | | | | | | 5 | | |
| Procion blue HEG dianilide | | CAS NA | | | | | | | 9 | | |
| p,p'-(dichloromethylene)bis[N,N-dimethylaniline] | | CAS NA | | | | | | 1 | 0 | | |
| Quinoline compounds | | None | | | | | | | 1 | | |
| Reax 83A powder | | CAS NA | | | | | | | 3 | | |
| Red lake C amine | | CAS NA | | | | | | | 3 | | |
| Sandozin | | CAS NA | | | | | | | 1 | | |
| Solapol oil | | CAS NA | | | | | | | 1 | | |

| | Synonyms | CAS # | EPA Record Samples | CPMA Split Samples | Public Comments | Colour Index | TRI | TAM CI | §3007 Q | Merck | Toxicity Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sudan orange 6 | | CAS NA | | | | | | | 3 | | |
| Sulfate ester | | CAS NA | | | | | | | 3 | | |
| Sulfomethyl blue | | CAS NA | | | | | | | 4 | | |
| Sulfone | | CAS NA | | | | | | | 2 | | |
| Sulfonic acid | | CAS NA | | | | | | | 12 | | |
| Sulfonylurethan | | CAS NA | | | | | | | 1 | | |
| Surfonyl 104 | | CAS NA | | | | | | | 1 | | |
| Surfynol | | CAS NA | | | | | | | 1 | | |
| SYI | | CAS NA | | | | | | | 1 | | |
| Total Organic Carbon | | None | | X | | | | | 0 | | |
| Total Suspended Solids | | None | | X | | | | | 0 | | |
| Trichlorobenzenes | 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,3,5-trichlorobenzene | None | | 3 | | | | | 0 | | |
| Trisulphoil soap | | CAS NA | | | | | | | 1 | | |
| Tris[2-)2-hydroxyethoxy)ethyl]amine | | CAS NA | | | | | | | 2 | | |
| U | | CAS NA | | | | | | | 1 | | |
| Xylidines (mixed) | | None | | | | | | | 6 | | |
| Yellow dye | | None | | | | | | | 2 | | |

Attachment 3
Dyes and/or Pigments Manufacturers Reporting TRI Releases in 2000

| D&P Manufacturer | City | State |
|---|---|---|
| Abbey Color Inc. | Philadelphia | PA |
| AC & S Inc. | Nitro | WV |
| Apollo Colors Inc. | Rockdale | IL |
| BASF Corp. | Huntington | WV |
| Bayer Corp. Bushy Park Plant | Goose Creek | SC |
| Blackman Uhler Chemical Co. | Spartanburg | SC |
| CDR Pigments & Dispersions | Elizabethtown | KY |
| CDR Pigments & Dispersions | Holland | MI |
| CDR Pigments & Dispersions | Woodlawn | OH |
| Chemical Compounds Inc. | Newark | NJ |
| Ciba Specialty Chemicals Corp. | Saint Gabriel | LA |
| Clariant Corp. | Coventry | RI |
| Clariant Corp. | Martin | SC |
| Colorcon | West Point | PA |
| Daicolor-Pope Inc. | Paterson | NJ |
| Dye Specialties | Jersey City | NJ |
| Eastman Chemical Co. Tennessee Ops. | Kingsport | TN |
| Galaxie Chemical Corp. | Paterson | NJ |
| Harshaw Chemical Co. A Wholly Owned Subsidiary of Engelhard | Louisville | KY |
| Indol Color Co. | Carteret | NJ |
| Industrial Color Inc. | Joliet | IL |
| Lobeco Prods. Inc. | Lobeco | SC |
| Magruder Color Corp. | Elizabeth | NJ |
| Max Marx Color Corp. | Irvington | NJ |
| Nation Ford Chemical Co. | Fort Mill | SC |
| Noveon Hilton Davis Inc. | Cincinnati | OH |
| Roma Color Inc. | Fall River | MA |
| Royce Associates L.P. Passaic Color & Chemical | Paterson | NJ |
| Sun Chemical Corp. | Muskegon | MI |
| Sun Chemical Corp. | Cincinnati | OH |
| Sun Chemical Corp. Rosebank Plant | Staten Island | NY |
| Tricon Color L.L.C. | Elmwood Park | NJ |
| Warner Jenson Cosmetic Colors | South Plainfield | NJ |
| Warner-Jenkinson Co. Inc. | Saint Louis | MO |
| Yorkshire Americas Inc. | Lowell | NC |